# The Housing / Climate Connection

Colorado Energy Office
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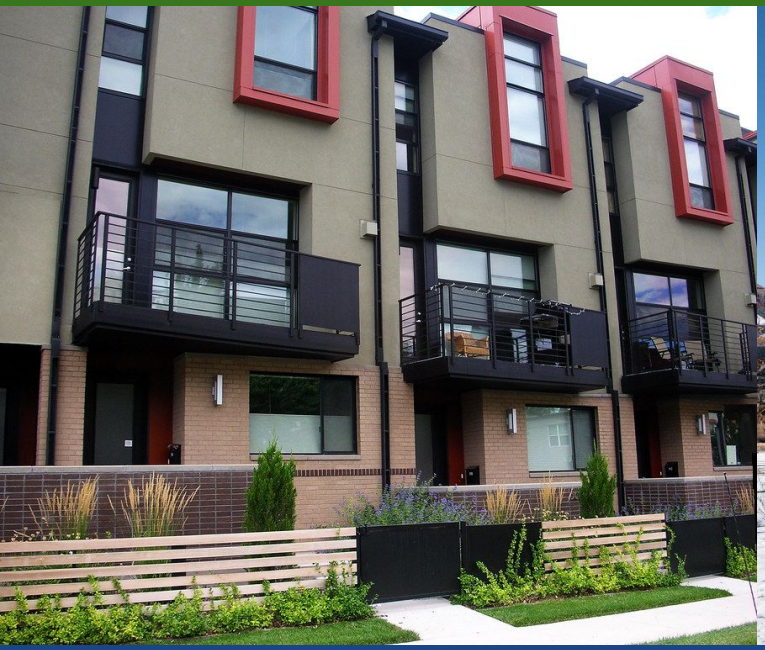
September 21, 2021



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# Outline

- Low/Zero Energy Construction and Affordability
- The Land Use/Climate Connection and Affordability

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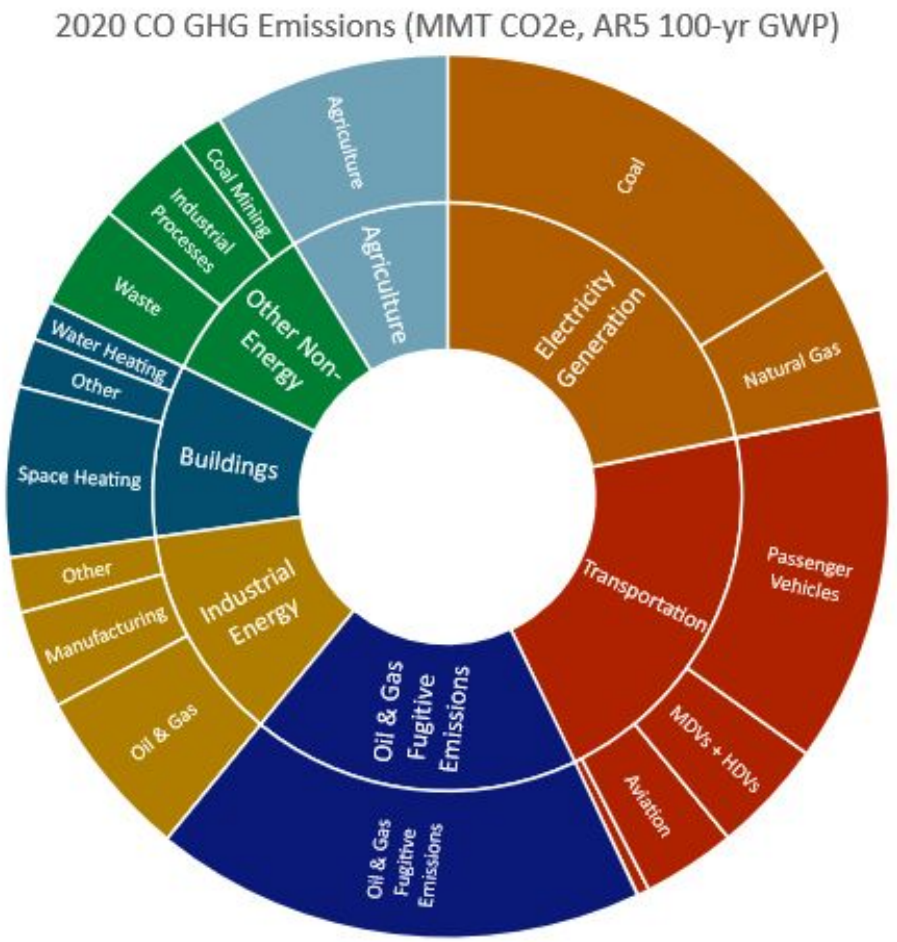
# Why are building energy and transportation impacts important considerations for housing?

**From a climate perspective:**

➔ Buildings and transportation are two of Colorado's top five largest GHG emitting sectors

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# Why are building energy and transportation impacts relevant to affordable housing?

**From a cost and equity perspective:**

- **Building energy:** The median Colorado household spends roughly 2% of its income on home energy. However, roughly 20% of Colorado households spend at least 5% of their income on energy and 48% spend over 2%.
- **Transportation:** Households making less than $40,000/year in the west spend over 24% of their income on transportation, over 90% of that on vehicle expenses. Spending over 15% of household income on transportation is considered cost-burdened.

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**Sources:** Bureau of Labor Statistics Consumer Expenditure Surveys.

# What do we mean by low energy/low emissions housing?

- **Energy efficiency** - insulation, air sealing, passive solar, high-performance windows, ENERGY STAR appliances, etc.
- **Clean, electric heating and appliances** - efficient air source or ground source heat pumps, heat pump water heaters, induction stoves
- **Renewables** - rooftop or community solar

*Benefits include energy savings, health and safety, comfort, and durability*

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# Example: Basalt Vista

- ➔ All-electric, net zero workforce housing community of 27 homes in the Roaring Fork Valley
- ➔ Homes priced at $270,000-$395,000 for two to four bedroom units
- ➔ Saved $30,000-$40,000 on new natural gas line connections plus eliminated monthly natural gas fixed charges
- ➔ Rooftop PV plus cold-climate air source heat pumps, heat pump water heaters, and induction stoves lead to avg. electric bills <$15/month
- ➔ Multi-partner collaboration made it possible

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# Example: Josephine Commons - Lafayette

**70 senior units • 54 townhouse units • 22 duplex units • 7 single-family**

- ➔ Individual heat pumps serviced via a vertical ground source geothermal bore field
- ➔ 50 geothermal bore holes installed through existing coal mine shafts
- ➔ Rooftop PV system produces 98KW + 30KW on carport parking structure
- ➔ All units equipped with water conserving appliances and fixtures, efficient lighting and individual electrical submeters
- ➔ 30% savings from baseline ASHRAE 90.1

# Example: Alta Verde - Breckenridge

- ➔ March 2021 construction start
- ➔ All electric with PV (funded through DOLA grant)
- ➔ Using heat pumps w/condensing units placed under the rooftop solar panels
- ➔ 80 units
  - ◆ 64 LIHTC units (9% tax credit) for residents 30-60% of AMI
  - ◆ 16 non-LIHTC workforce housing units

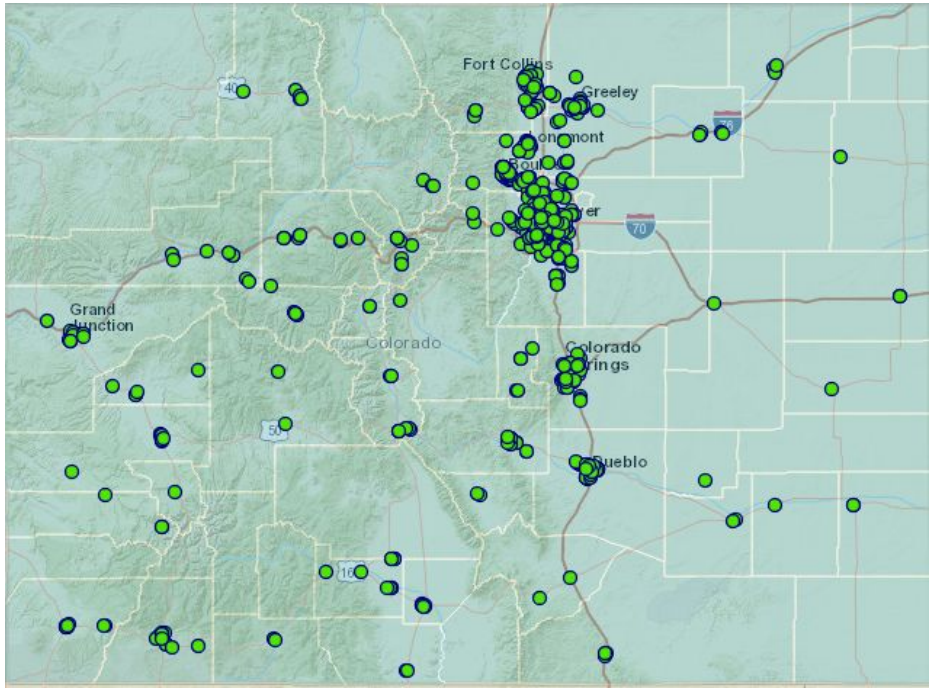
# CHFA Affordable Housing Guidelines

**CHFA 2021-22 QAP requirements**

- Support affordable housing constructed to high energy performance standards / must meet minimum green building certification
- EV-ready parking requirements
- Annual energy benchmarking

**Group 14 study** ***(results in early December 2021)***

- Analysis of the opportunities and challenges of affordable housing decarbonization
- Comparison of energy savings plus construction and operating costs of 14 LIHTC all electric and nearly all electric projects in Colorado




*Map of CHFA LIHTC Projects*

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# Potential Strategies

- ➔ Dedicated financing for energy improvements on affordable housing - retrofit and new construction (example, NY Green Bank $150 million aff housing fund)
- ➔ Grant funding for efficiency, renewables and electrification improvements on affordable housing - retrofit and new construction
- ➔ Minimum energy standards as condition of receiving state investment in new construction or rehabilitation (example, CHFA QAP guidelines)
- ➔ Support for low/zero energy modular home development

# Land Use Overview

- ➔ Walkable, compact neighborhoods and transit oriented development help reduce emissions by using less energy and providing more transportation options and by supporting multifamily housing.
- ➔ Compact development,also can provide increased access to jobs and opportunity, improved public health outcomes, lower water usage, and lower transportation costs.

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# Examples of compact, walkable development

## Transit-oriented development

*"commonly defined as high-density, mixed-use development within walking distance (a 1/2 mile) of a transit station."*

**Example - Apartments at Yale Station:** a six-story, 50 unit senior affordable housing project, located adjacent to the Yale light rail station.

## Redevelopment

*Recycling already developed but underutilized parcels, including "adaptive reuse," i.e. converting an existing building to a new, more productive use*

**Example - Blue Dot Place:** four-story, a 33-unit mixed-use redevelopment of former retail/surface parking in downtown Colorado Springs.

## Infill

*Developing vacant parcels within existing urbanized areas that have been passed over in the normal course of development.*

**Example - Yarmouth Way, Boulder:** a 25-unit mixed-income development of a vacant infill parcel in Boulder, with a range of unit types.

# Compact land use and affordability: CO examples

**Sheridan Station Apartments**
W Line - Denver

- 133 units for households earning 30-60% of AMI
- Adjacent to light rail station and bike path

**Roaring Fork Apartments**
RFTA bus service - Basalt

- 56 units mixed income units (44 affordable to 30-60% AMI, remainder 120% AMI)
- Located 300 feet from RFTA bus stop

**Depot Square Apartments**
Flatiron Flyer - Boulder

- 71 units for households earning 60% of AMI
- Adjacent to Boulder Junction station

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# Land Use in the GHG Roadmap

- ➔ “State agencies must work with local governments and MPOs to develop strategies to promote more sustainable land use, and should develop criteria to use state investment to incentivize smart land use decisions which preserve land, create housing opportunities, reduce infrastructure costs and reduce emissions.”
- ➔ SB 21-260 requires CDOT to “CONSIDER THE ROLE OF LAND USE IN THE TRANSPORTATION PLANNING PROCESS AND DEVELOP STRATEGIES TO ENCOURAGE LAND USE DECISIONS THAT REDUCE VEHICLE MILES TRAVELED AND GREENHOUSE GAS EMISSIONS. “

Business along a Colorado Main Street
Source: Colorado.gov, 2019

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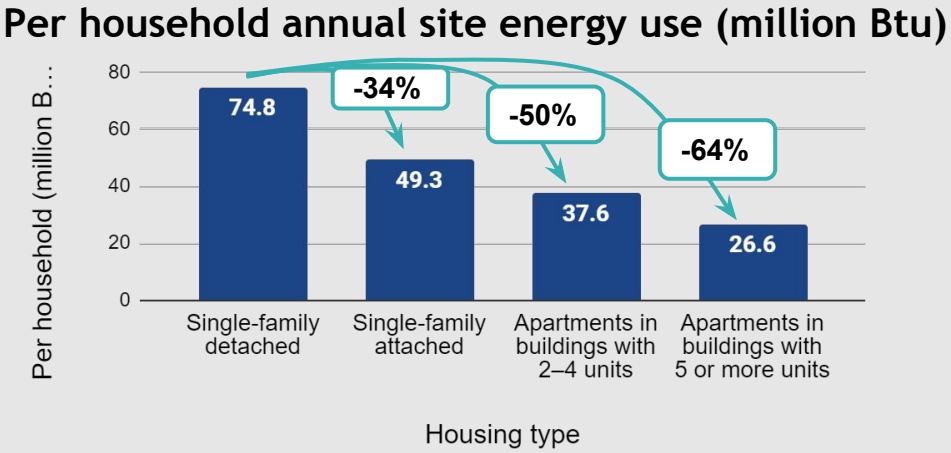
# Climate benefits of compact land use

## Reduced Driving (VMT):

- ➔ Compact development can **reduce per capita vehicle miles traveled (VMT) 20 to 40%** compared to sprawl. [1]
- ➔ DRCOG has found shifting future development to compact areas and investing in transit would **reduce VMT 24%, increase walking and biking 3x, and increase transit trips 6x by 2050.**[2]

## Reduced Household Energy Use:

- ➔ Compact housing units use less energy for space heating and cooling, due to typically **smaller floor area** and **attached walls that reduce losses.**[3]

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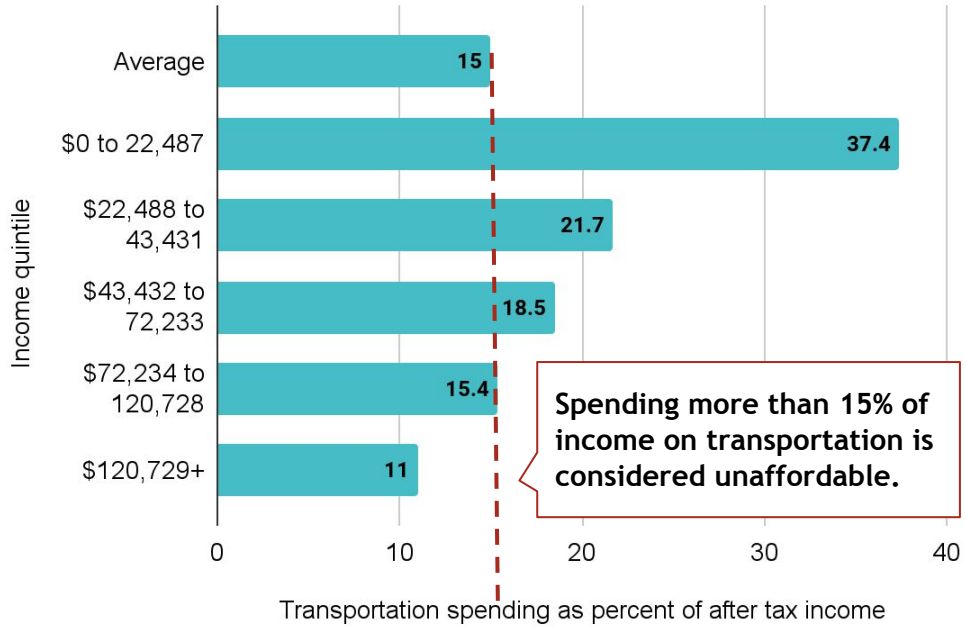
**Sources:** [1] Ewing, R., Bartholomew, K., Winkelman, S., Walters, J., Chen, D., McCann, B., & Goldberg, D. (2007). Growing cooler: The evidence on urban development and climate change. [2] DRCOG Scenario Planning Technical Memo [3] Energy Information Administration, 2015 Residential Energy Consumption Survey.

# Compact land use and affordability

- **Reduced transportation costs:** Households in Colorado living in compact neighborhoods are estimated to spend about **$2,000 less annually on transportation.** [1]
- **Increased access to opportunity:** Researchers have found **"upward mobility is significantly higher in compact areas** than sprawling areas", primarily due to better job accessibility by multiple transportation modes.[2]

**Average Household Transportation Expenditures by Income Quintile (BLS)**

*Lower income households in the U.S. spend a disproportionate share of their income on transportation*

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**Sources:** [1] Center for Neighborhood Technology, Housing+Transportation Affordability Index
[2] Ewing, R., Hamidi, S., Grace, J. B., & Wei, Y. D. (2016). Does urban sprawl hold down upward mobility?. *Landscape and Urban Planning*, *148*, 80-88.

# Exclusionary zoning is often a significant barrier

**Many local governments  exclude affordable housing options through:**

- ➔ Occupancy limits
- ➔ Bans or restrictive rules on ADUs
- ➔ Prohibiting duplexes, triplexes and 4-plexes in most residential districts
- ➔ Minimum lot size restrictions
- ➔ Minimum parking requirements even in transit rich walkable areas
- ➔ Limits on apartments, townhomes and condominium construction
- ➔ Making affordable housing subject to discretionary review processes that empower opponents

# States starting to address exclusionary zoning

- **Oregon:**
  - HB 19- 2001 Required cities >25,000 residents to make up to 4-plexes by right in residential zones.
  - Land use board has since lowered parking minimums in the same contexts.
- **California:**
  - 5 pieces of legislation to ensure that all cities meaningfully allow ADUs
  - CA legislature just approved SB 9 to allow duplexes on all residential lots
  - Reduced parking minimums for affordable housing projects near transit
- **Iowa, Oregon and Washington:** all recently prohibited occupancy restrictions based on family status
- **CO HB 21-1117 and HB 21-1271:** create incentives for zoning reform

# State incentive-based examples

| Program | Description |
|---|---|
| **Massachusetts Smart Growth Zoning Overlay (Chapter 40R)** | • Municipalities receive a zoning incentive payment when they create a smart growth overlay district followed by a bonus unit payment per unit permitted.<br>• District overlays are required to be in an eligible location (e.g. within a half mile of transit), have adequate infrastructure, must allow housing to be built as-of-right at densities of at least 8-20 units per acre, and develop at least 20% of the units to be affordable. |
| **Connecticut Incentive Housing Zones** | • Provides municipalities with technical assistance and incentives to create zoning districts that can accommodate additional mixed-income housing.<br>• Incentive Housing Zones must meet minimum unit density per acre by building type, affordability, and location (near downtown, transit, and/or existing or planned infrastructure). |
| **California Affordable Housing and Sustainable Communities Program** | • Funds land use, housing, transportation, and land preservation projects that support infill and compact development and reduce greenhouse gas (GHG) emissions.<br>• Funds are available in two kinds of project areas: TOD and Integrated Connectivity Project Areas.<br>• 50% of funds set aside for affordable housing, 50% for projects in disadvantaged communities. |



**Sources:** ULI, 2017. Yes In My Backyard: How States and Local Communities Can Find Common Ground in Expanding Housing Choice and Opportunity; CHAPA, 2018. The Use of 40R in Massachusetts; Affordable Housing and Sustainable Communities Program.

# Potential Strategies

- ➔ Focus investment on TOD and compact development sites
- ➔ Provide publicly owned  land for affordable housing in TOD sites
- ➔ Build on HB 1117/1271 by using funding incentives to support affordable housing tied to zoning reform; “race to the top” competition
- ➔ Consider examples from other states

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# Appendix slides: if needed to answer questions

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# Home Energy Burden

$$\text{Energy Burden} = \frac{\text{Energy Cost}}{\text{Household Income}}$$

$$\text{Colorado Energy Burden} = \frac{\$1{,}580}{\$77{,}127} = 2.0\%$$

Colorado average household energy cost divided by median income

| Income Range | Energy Burden Range | Percent of Population |
|---|---|---|
| $0 to $34,999 | More than 4.5% | 20.4% |
| $35,000 to $74,999 | 2.1% to 4.5% | 28.0% |
| $75,000 to $149,999 | 1.1% to 2.1% | 32.2% |
| $150,000 or more | Less than 1.1% | 19.4% |

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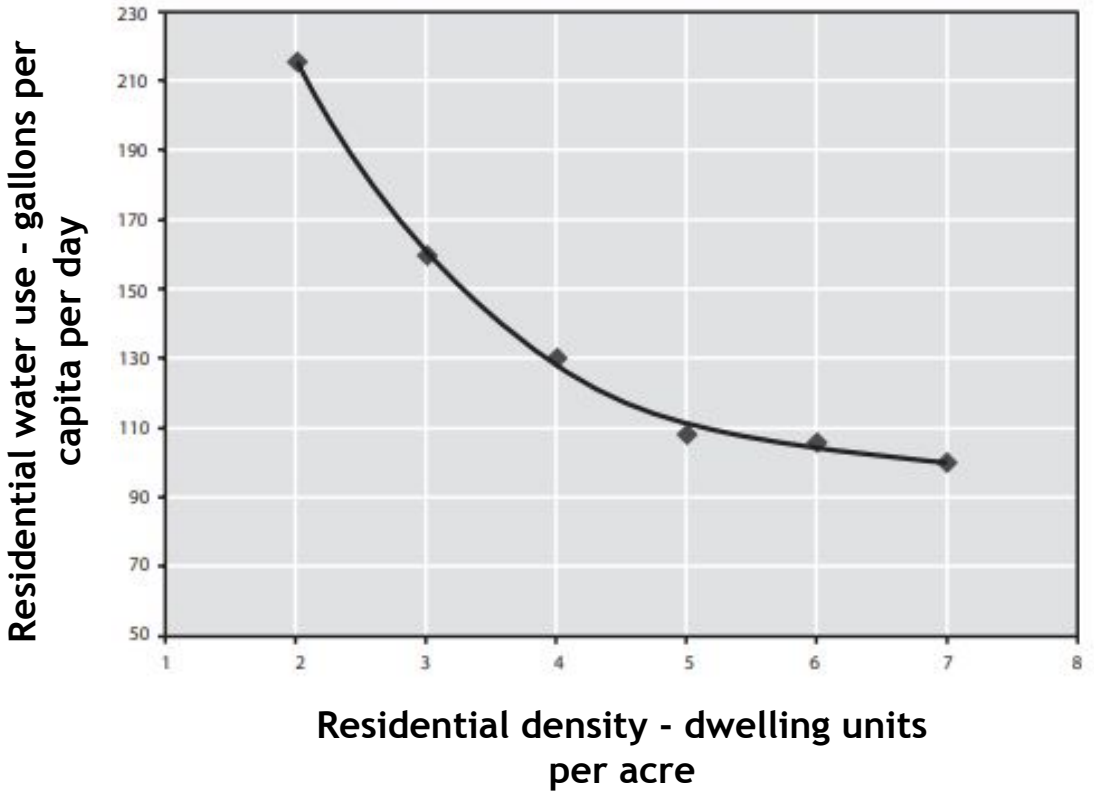
**Sources:** EIA Residential Energy Consumption Survey, 2009, Colorado state brief; US Census Bureau, American Community Survey, 2019, Colorado, Table S1901

# Compact land use co-benefits: Water Use

**Compact development reduces water use and costs through:**

- ➔ Shorter pipes that reduce losses (6-25% of water is typically lost through leaks and breaks)
- ➔ Less landscaped space per unit that reduces outdoor water use, a significant component of residential water use.
- ➔ Compact development makes better use of existing water infrastructure, instead of extending new lines.

**Per capita water use declines with higher density**
*(Envision Utah via EPA)*




**Source:** [EPA, 2006. Growing Toward More Efficient Water Use.]

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# Compact land use co-benefits: Public health

- **Benefits from increased physical activity:** In a study comparing counties nationwide, "residents of more compact counties have **lower BMIs** and **lower probabilities of obesity and chronic diseases**". [1]
- **Increased safety:** Compact development with good active transportation access can significantly decrease roadway injuries and fatalities. For every 1% change toward a more compact built environment, total traffic fatality rates fall by **1.5%**, and pedestrian fatalities by **1.5-3.6%**.[2]


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**Sources:** [1] Ewing, R., Meakins, G., Hamidi, S., & Nelson, A. C. (2014). Relationship between urban sprawl and physical activity, obesity, and morbidity–Update and refinement. Health & place, 26, 118-126. [2] Ewing, R., Schieber, R. A., & Zegeer, C. V. (2003). Urban sprawl as a risk factor in motor vehicle occupant and pedestrian fatalities. American journal of public health, 93(9), 1541-1545.

# Compact land use co-benefits: Economic impacts

**Compact development reduces upfront and ongoing public costs compared to low density:**

➔ Compact development can reduce infrastructure costs (e.g. roads, water, utilities) upfront by **one third**, and ongoing public service costs (e.g. maintenance, fire, police, schools) by **10%**.

**Compact development produces more economic benefits for local communities:**

➔ Compact development typically generates **10 times more tax revenue** per area than low density suburban development.

**Source:** Smart Growth America, Building Better Budgets, a National Examination of the Fiscal Benefits of Smart Growth Development.

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